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Artikel: Die Entwicklung zur experimentellen Pharmakologie 1790-1850 : Wegbereiter von Rudolf Buchheim
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Summary

1. The use of drugs goes back to the origins of mankind. In historical times oral drug-lore became codified empiric drug theory (materia medica) and ultimately, in the 19th century, experimental pharmacology. The initiator of experimental pharmacology as an independent medical discipline is Rudolf Buchheim (1820–1879). This study traces the pathways leading to Buchheim and identifies his predecessors between 1790 and 1850.

The history of empirical pharmacology and its major theories in Antiquity, the Middle Ages, and early modern times is summarized.

For the 18th century an overview is given on early attempts at experimental testing of drug effects and on the new therapeutic systems and medical sects.

2. Many authors have dealt with the grievances of pharmacology and therapy between 1790 and 1850, among them chief representatives of contemporary medicine like the French Fourcroy, Bichat, Pinel, Alibert, Magendie, and the Germans Schönlein, Mitscherlich, Wunderlich, Henle, and Oesterlen. Their criticisms are a means for a better understanding of the situation. They cover the following aspects. Pharmacology is distorted by speculations on the causes of drug action and confusion with regard to terminology and indications. Drug actions are being tested with inadequate methods. An increase in the number of drugs is mistaken for an increase in knowledge. The statement is made that pharmacology is the least developed of all medical subjects. The critics point out that only a more developped chemistry, physiology, and etiology will allow a scientific pharmacology. The drug theories of the medical sects are likewise rejected. Polypharmacy, composite drugs, and absurd formulas are regarded with contempt. Aggressive drug therapy is repudiated, but this easily results in avoidance of drugs and in therapeutic nihilism.

3. In 1799 Johann Christian Reil elaborated his principles for a future pharmacology. Reil establishes the rules for clinical experiments on which a scientific pharmacology should be based. His goal is to explain the actions of drugs which are the results of biochemical alterations. Even though Reil's program is a theoretical conception, it anticipates a situation that was to take shape half a century later.

Also in 1799 Adolph Friedrich Nolde published detailed rules for the critical examination of drug actions in patients, including aspects like placebo,

compliance, statistics, and several ethical rules. Reil's and Nolde's programmatic messages vanished in the emerging German medicine of "Naturphilosophie".

4. In the decades after 1800 medicine was at its zenith in the Paris School. It became a hospital medicine, based on anatomy and pathology. François Magendie was one of its representatives. He started out as a physician in 1808 and became a physiologist who soon surpassed his teachers Bichat and Richerand. Magendie's sole interest were facts, which had to be unravelled by experiments, mainly on animals. He created modern physiology based on the laws of physics and chemistry. Nevertheless, he remained an outsider among the Paris School.

Bichat and other predecessors of Magendie had considered an experimental pharmacology based on physiology, however, they did not provide knowledge resulting from experiments.

Magendie published his first experimental study of a pharmacological problem in 1809. From then on he studied the mechanism and site of action of drugs and used them at the same time as tools for the investigation of physiological processes. After Sertürner's isolation of morphine from opium the preparation of pure alkaloids became a specialty of French pharmacists and chemists. Magendie sought their collaboration from 1817 on, convinced that pharmacology and therapy must be based on both physiology and chemistry. In 1821 he published his *Formulaire pour la préparation et l'emploi de plusieurs nouveaux médicamens* which marks the beginning of modern pharmacology. It grew throughout eight editions up to 1835. The work provides information on new pure drugs such as their physical and chemical properties, physiological properties (effects in animals), effects on healthy and sick people, indications and formulations. Magendie founded pharmacology as a method, not yet as a subject.

5. In Germany around 1800 medicine and therapy were in a rather chaotic state. Little influenced by France and Magendie it was a breeding place for medical systems and sects, important among them those of Brown and of Hahnemann. These were in turn dominated by the medical school of Schelling's "Naturphilosophie" which characterized German medicine of the romantic period. Yet, its speculative system slowly gave way to the increasing belief that the efficacy of drugs should be tested experimentally in healthy and sick humans as well as in animals. Magendie's views gradually spread in Germany, one of his first followers being Purkinje. Others like Hergenröther, H. E. Richter, Schroff, Albers enriched pharmacology with modern ideas but

remained theoretical or referred to other authors' experiments. The old materia medica was shaking, but a new pharmacology did not appear before 1840. Therapy was still moving between aggressive therapy with ineffective or hazardous drugs on the one hand and therapeutic nihilism on the other.

In France Magendie was an exception surrounded by many traditionalists. Flourens and Barbier produced some experimental work in pharmacology. The exquisite contributions of Claude Bernard, Magendie's disciple and a promotor of physiology, pharmacology, and toxicology, appeared only in the second half of the century.

In Britain, Scotland in particular, many physiologists were active between 1790 and 1850, some of whom enriched pharmacology and toxicology: A. Philip Wilson, B. C. Brodie, Christison, Addison, Paris, Blake, Pereira. They were influenced by Magendie or else by Germans of the mid-century.

In Italy Semmola and Giacomini contributed to modern views in pharmacology.

6. The revolutionary 1840s in Germany also brought forward a renewal in medicine. In four famous texts the great physicians, Wunderlich, Henle, Griesinger, and Oesterlen criticized both contemporary medicine and pharmacology and outlined their future which must be based on science, physiology, and the experimental approach.

In addition to these theorists, at least two authors devoted themselves as experimentalists to the promotion of a scientific pharmacology: Falck and Mitscherlich.

7. The most important pharmacologist of the 1840s was Rudolf Buchheim (1820–1879). Around 1845 this physician was scientifically influenced by the biochemist, K. G. Lehmann, and the physiologist, E. H. Weber, in Leipzig where he also worked for medical reference works. His translation and revision of Pereira's textbook earned him the chair of pharmacology in Dorpat. His major achievements there were the creation of the first department of pharmacology in 1847, experimental studies with his doctoral students, a modern textbook, programmatic writings, and the training of Oswald Schmiedeberg.

Buchheim's two programmatic texts on the definition, task, and contents of pharmacology which appeared before 1850 contain most of what is said in his later texts. The vision and the weight of these texts clearly surpass those of Buchheim's predecessors.

A comparison of Buchheim's and his predecessors' theses shows that more than a score of Buchheim's ideas can be found in works of his predecessors.

This comparison reveals the most important predecessors: Magendie, Mitscherlich, Wunderlich, H. E. Richter, Reil, Falck, Barbier, Giacomini, Blake, Pereira, Henle, and Oesterlen. Other theses are clearly Buchheim's, some of them modern statements which had to await the 20th century to be confirmed. Buchheim as an experimentalist was inferior to Magendie, however, he was the one to succeed in institutionalizing pharmacology as an independent medical subject.

While Buchheim won little recognition, his disciple Schmiedeberg was successful. During his activity in Strassburg 1872–1918 he experimentally dealt with almost any field of pharmacology and succeeded in laying it on a solid scientific foundation and thus make it a guide for therapy. In particular, he trained a generation of modern pharmacologists who were called to the chairs in Germany and abroad including the USA. From 1870 on pharmacology also entered the new pharmaceutical industry. The greatest triumphs of pharmacology were the development of sulfonamides and antibiotics from 1930 on, followed by a multitude of new potent drugs after WWII. This development finally resulted in pharmacology becoming the basis of drug therapy.